

# MEETINGS

## THE 1998 NSLS ANNUAL USERS' MEETING

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NSLS Users' Executive Committee Chairman

The NSLS users held their Annual Users' Meeting on Tuesday May 19, 1998 at Brookhaven National Laboratory (BNL). It allowed many users to meet the new BNL contractor, Brookhaven Science Associates (BSA), for the first time, obtain the latest news from the Department of Energy (DOE), and review and celebrate scientific accomplishments. On the Monday and Wednesday bracketing this meeting, users attended a total of six workshops.

The meeting began with an extended introduction by Peter Paul, BNL Deputy Director for Science & Technology. John Marburger, Director of BNL then elaborated on these remarks, pointing out that users of the facilities at BNL are its primary customers and summarizing some of the trauma which resulted in the termination of the AUI contract to operate BNL and the successful bid by BSA. He indicated a willingness to represent the interests of users in Washington DC, and particularly the need to improve infrastructure and user support.

The subject of the meeting then turned to science. Larry Carr of the NSLS gave a presentation entitled "Infrared at the NSLS - A Long Wavelength Probe of Small Things on Short Time Scales". Larry described the facilities at U12IR along with spectra showing the performance advantage over conventional sources. The signal throughput for small samples exceeded that obtained with the spectrometer's internal source (a high pressure mercury arc lamp) by more than 2 orders of magnitude in the far infrared. Spectra down to  $1\text{ cm}^{-1}$  were shown, including an observation of enhanced signal at  $1.4\text{ cm}^{-1}$  (42GHz).

Cev Noyan of the T.J. Watson Research Center of IBM described the "Determination of Mechanical Properties of Thin Film Interfaces with X-Ray Microdiffraction" at the X20A beamline. The (buried) interfaces between polycrystalline Al, Cu and W thin-film features and their substrate (single crystal Si) were characterized using the Si (004) reflection. Topographic images of the Si around and under the metallization



John Marburger, New Director of Brookhaven National Laboratory, updating users on recent changes at BNL and its new manager, Brookhaven Science Associates.

features were constructed, showing that a fully elastic "mosaic" structure develops in the Si under the thin film features.

The first speaker after the morning break was Michael Hart, Chairman of the NSLS. He pointed out the positive light in which the NSLS was painted by the recent BESAC review and that the FY99 presidential budget includes an increase for support of users of some 5.2%. He cautioned, however, that these increases might prove illusory. Michael Hart also pointed out the dramatic increase in the number of life science users over the past 5 years and the expectation that they will soon constitute the largest user group at the NSLS.

Some of the concerns with funding by the U. S. Department of Energy (DOE) were addressed by Robert Marianelli, Director of the Division of Chemical Sciences for the Office of Basic Energy Sciences (BES). He assured the users of the importance of basic science to the mission of the DOE. The BES program contributes 2 billion dollars per year, or 17% of all federal funding for the physical sciences. In response to questions regarding the budget negotiation process, he agreed that it is every citizen's right to make their elected representatives aware of decisions which adversely affect their interests.

Barbara Illman (University of Wisconsin, USDA/FS Forest Products Lab) next described part of her research program at beamlines X26A and X27. With the microprobe at X26A, she and collaborators are employing new, non-destructive synchrotron techniques for detecting iron and manganese oxidation states in wood to study biochemical mechanisms of fungal decay. She and Betsy Dowd (NSLS) work at X27 to develop novel synchrotron techniques for element mapping in 3-dimensional images of preservative-treated wood.

In the time remaining in the morning session the users had an opportunity to thank representatives from NSLS staff and BNL Plant Engineering who worked to repair power cables responsible for a shutdown in December 1997. The repair to the NSLS were so well managed that most users did not know there had been a major power failure until the User Meeting.

The Scientific Highlight speech was given directly after lunch. Nobelist James Watson, President of the Cold Spring Harbor Laboratory, presented a retrospective of his life's work "From the Double Helix to the Human Genome Project". This was followed by a presentation by Wayne Hendrickson of Columbia University/HHMI. In collaboration with researchers from Dana-Farber



Left to right, NSLS Annual Users' Meeting Organizing Committee: John Hill (BNL Physics), Harald Ade (NCSU), Nancye Wright (NSLS), Elaine DiMasi (BNL Physics), Linda Feierabend (NSLS) and John Parise (SUNY at Stony Brook).

Cancer Institute, SmithKline Beecham Pharmaceuticals, and Tulane University Medical Center, they were able to obtain small crystals of the HIV-1 gp120 envelope glycoprotein in complex with the CD4 receptor and a neutralizing human antibody. The crystals were needles of only 30-40 microns in cross-section, and required the intense synchrotron radiation on NSLS beamline X4A for data collection. They were able to solve the structure at 2.5 Å resolution. The structure reveals the details of the CD4-gp120 interface, a conserved binding site for the chemokine receptor, evidence for a conformational change upon CD4 binding, the nature of a CD4-induced antibody epitope, and specific mechanisms for immune evasion. The results provide a framework for understanding the complex biology of HIV entry into cells and should guide efforts at intervention.

Ian Robinson of the Physics Department, University of Illinois, Urbana spoke about grazing X-rays and electrochemical interfaces. The examples presented included the electrochemical oxidation of copper, specifically at the Cu(111) surface. Structural studies of the native oxide formed in air show an epitaxial film of Cu<sub>2</sub>O (cuprite) which gradually thickens over several hours following electropolishing. Both hexagonal orientations of the interface form simultaneously with equal proportions. The situation is very different in acidic solution, where the oxidation and reduction can be driven by an external potential. There, only one epitaxial orientation of the film is found to grow thick; the other orientation forms, but always remains a single monolayer in thickness.

Peter D. Johnson of the BNL Physics Department gave a talk on recent advances in High Resolution Photoemission applied to the study of low dimensional oxides, in particular the High T<sub>c</sub> superconducting materials. New developments in instrumentation now allow the energy and angular distributions of the photoelectrons to be measured in parallel, and with much higher energy resolution than in earlier studies.

The Keynote Address was delivered by Dr. Ernest J. Moniz, Under Secretary of Energy at the US Department of Energy. Given the recent history of BNL, his opinions were of interest to an audience beyond the users of the

NSLS and the numbers of people in the auditorium swelled during his presentation. Dr. Moniz began by commenting that BNL is regarded as amongst the best of the research laboratories in the country and that the new BNL management team lead by Dr. John Marburger is "hitting the ground running". He also emphasized that the recent Birgeneau report, which emphasized the growing importance of the four DOE synchrotrons in the nation's research programs, praised the NSLS for the number of users served and its education and outreach to new users.

Other important parts of the meeting included the reception the evening before the meeting, poster sessions, a barbeque luncheon outdoors under a tent and an equipment exhibit attended by 17 vendors. All were held in Berkner Hall and all were popular with the users. The election of three new members to the User Executive Committee took place during the Annual Meeting: John Hill (BNL Physics Department), Carol Hirschmugl (U. of Wisconsin), and Lisa Kelly (U. of Maryland) were elected as general members, and the UEC chose Barbara Illman to be its Vice-Chair (Chair-Elect). The Annual Meeting was capped off that evening by a banquet at the Port Jefferson Country Club which overlooks the Long Island Sound. ■



Left to right: John Parise (SUNY at Stony Brook), current NSLS User Executive Committee Chairman; Carl Zimba (NIST); and Joel Brock (Cornell U.) former UEC Chairman, between User Meeting sessions.